REMARKS

The present Amendment amends claims 1-20. Therefore, the present application has pending claims 1-20.

In paragraph 5 of the Office Action the Examiner alleges that the lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. The specification was reviewed so as to uncover any minor errors that required correction. No such errors were uncovered. Therefore, the specification as originally filed clearly describes the features of the present invention without significant errors. However, the Examiner's cooperation is respectfully requested to identify any errors the Examiner may be aware so that such errors can be immediately corrected to expedite prosecution of the present application.

Claims 1-10 and 12-18 stand rejected under 35 USC §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regards as their invention. Various amendments were made throughout claims 1-10 and 12-18 to bring them into conformity with the requirements of 35 USC §112, second paragraph. Therefore, Applicants submit that this rejection is overcome and should be withdrawn.

Specifically, amendments were made throughout claims 1-10 and 12-18 to correct the informalities noted by the Examiner in paragraphs 8-11 of the Office Action. However, it should be noted that the Examiner's suggested corrections in paragraphs 10 and 11 of the Office Action are not necessary since the original language of the claims are clear.

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The Examiner's cooperation is respectfully requested to contact Applicants' Attorney by telephone should any further indefinite matter be discovered so that appropriate amendments may be made.

Claim 11 stands rejected under 35 USC §102(b) as being anticipated by Inoue (U.S. Patent No. 5,459,856); and claims 1-10, 12-15 and 18-20 stand rejected under 35 USC §103(a) as being unpatentable over Inoue in view of Ofek (U.S. Patent No. 6,356,977). This rejection is traversed for the following reasons. Applicants submit that the features of the present invention as now more clearly recited in claims 1-15 and 18-10 are not taught or suggested by Inoue or Ofek whether taken individually or in combination with each other as suggested by the Examiner. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw these rejections.

Amendments were made to the claims so as to more clearly describe features of the present invention not taught or suggested by taught or suggested by any of the references of record whether taken individually or in combination with each other. Particularly, amendments were made to the claims to more clearly recite that the present invention is directed to a storage system that is connected to a computer and another storage system including a first storage device wherein the storage system provides a logical volume which corresponds to a storage device in the storage system or the another storage system transparent from the computer.

According to the present invention as recited in the claims the storage system includes a first control section that is connected to the computer, a second control section that includes a second storage device that stores data to be used by the computer and a cache memory and that temporarily stores

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data from the first control section before storing in the second storage device, a third control section that is connected to the another storage system which includes another cache memory for temporarily storing data before storing the data in the first storage device, and an internal network that mutually connects the first control section, second control and third control section.

Further, according to the present invention the first control section receives from the computer a first input/output request having first identification information indicative of the logical volume to be accessed, and selects one of the second control section or the third control section based on the first identification information and sends a second input/output request corresponding to the first input/output request to the second control section or the third control section.

The above described features of the present invention now more clearly recited in the claims are not taught or suggested by any of the references of record whether taken individually or in combination with each other. Particularly, the above described features of the present invention as now more clearly recited in the claims are not taught or suggested by Inoue or Ofek whether taken individually or in combination with each other as suggested by the Examiner.

Inoue discloses a system having a plurality independent access paths for permitting independent access from the host to the respective memories of a storage device. Particularly, as illustrated, for example, in Fig. 1 thereof, Inoue teaches that a plurality of independent cache units 80, 81 and non-volatile memory units 90, 91 are provided in a disk controller 2 located between a host 1 and a magnetic disk drive 3. Inoue teaches that a plurality

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of channel units 60, 61 are provided for controlling the data transfer to and from the host 1 and a plurality of control units 70, 71 are provided for controlling the data transfer to and from the magnetic disk drive 3. Inoue teaches that the channel units 60, 61 and the control units 70 and 71 are independently connected to the cache units 80, 81 and the nonvolatile memory units 90 and 91 through data buses and access lines.

However, the above described teachings of Inoue do not anticipate nor render the features of the present invention as now more clearly recited in the claims. Particularly, there is no teaching or suggestion in Inoue of the concept of providing a virtual (logical) volume wherein the actual physical location of the logical volume is transparent from the host computer. According to the present invention virtual volumes are provided to the host computer and such virtual volumes are made to correspond to actual physical locations of storage devices in the storage systems. As clearly recited in the claims, the logical volume could, for example, correspond to a storage device in the storage system or a storage device in the another storage system. Such a configuration and the corresponding features are not possible in Inoue.

Further, there is no teaching or suggestion in Inoue of the features recited in the claims regarding the content and functionality of each of the first, second and third control sections.

As recited in the claims, the first control section is connected to the computer and the second control section includes a second storage device that stores data to be used by the computer and a cache memory and that temporarily stores data from the first control section before storing the data in the second storage device.

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Further, as recited in the claims the first control section receives from the computer a first input/output request having first identification information indicative of the logical volume to be accessed and selects one of the second control section or the third control section based on the first identification information and sends a second input/output request corresponding to the first input/output request to the second control section or the third control section.

Inoue teaches the use of channel units 60, 61 and control units 70, 71. However, there is no teaching or suggestion of the internal content/configuration of these units. Specifically there is no teaching or suggestion in Inoue that the channel or control units each include a cache memory for temporarily storing data. Further, these units as taught by Inoue do not perform the functions of the first, second and third control sections as recited in the claims namely that by use of the cache memory resident, for example, the second control section a staging/destaging operation can be performed between the second control section and the storage device of the storage system. Such is not possible nor is it taught by Inoue.

Further, Inoue does not teach or suggest a control section in the storage system that is connected to the another storage system so as to perform the staging/destaging operations between the storage system and the another storage system via the third control section of the storage system and the another cache memory in the another storage system as in the present invention. As described above, Inoue simply teaches the use of the channel units 60, 61 and the control units 70, 71 to receive and transmit data to and from the host and the magnetic disk drive.

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Thus, Inoue fails to teach or suggest a storage system that is connected to a computer and another storage system including a first storage device wherein the storage system provides a logical volume which corresponds to a storage device in the storage system or the another storage system transparent from the computer as recited in the claims.

Further, Inoue fails to teach or suggest a second control section that includes a second storage device that stores data to be used by the computer and a cache memory and temporarily data from the first control section before storing in the second storage device as recited in the claims.

Still further, Inoue fails to teach or suggest a third control section that is connected to the another storage system which includes another cache memory for temporarily storing data before storing the data in the first storage device as recited in the claims.

Even further, Inoue fails to teach or suggest that the first control section receives from the computer a first input/output request having first identification information indicative of the logical volume to be accessed, selects one of the second control section or the third control section based on the first identification information and sends a second input/output request corresponding to the first input/output request to the second control section or the third control section as recited in the claims.

Therefore, Inoue fails to teach or suggest the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 USC §102(b) rejection of claim 11 as being anticipated by Inoue is respectfully requested.

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The above described deficiencies of Inoue are not supplied by any of the other references of record. Particularly, the above described features shown above not to be taught or suggested by Inoue are not taught or suggested by Ofek.

Ofek simply teaches a system and method for providing online realtime transparent data migration from an existing storage device to a replacement storage device. However, at no point in Ofek is there any teaching or suggest corresponding to the features of the present invention as recited in the claims shown above not to be taught or suggested by Inoue. Particularly, at no point is there any teaching or suggest in Ofek of the above described features of the present invention regarding the implementation of virtual volumes transparent to the computer system and the configuration and functionality of the first, second and third control sections. As described above, the first, second and third control sections perform staging/destaging operations and at least the second control section includes a cache memory for temporarily storing data. Such features are clearly not taught or suggested by Ofek.

Thus, Ofek suffers from the same deficiencies relative to the features of the present invention as recited in the claims as Inoue. Therefore, the combination of Inoue and Ofek as suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 USC §103(a) rejection of claims 1-10, 12-15 and 18-20 as being unpatentable over Inoue in view of Ofek is respectfully requested.

Applicants acknowledge the Examiner's indication in paragraph 31 of the Office Action that claims 16 and 17 would be allowable if rewritten in

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independent form including all the limitations of the base claim and any intervening claims and rewritten to overcome the rejection under 35 USC §112, second paragraph. Amendments were made to claims 16 and 17 to place them in independent form including all the limitations of the base claim and any intervening claims. Further, amendments were made to claims 16 and 17 to overcome the 35 USC §112, second paragraph rejection. Therefore, claims 16 and 17 are allowable as indicated by the Examiner.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references utilized in the rejection of claims 1-15 and 18-20.

In view of the foregoing amendments and remarks, applicants submit that claims 1-20 are in condition for allowance. Accordingly, early allowance of claims 1-20 is respectfully requested.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417 (ASA-5050).

Respectfully submitted,

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